Amendment to the Claims

In the Claims:

Please add new Claim 48.

1. (Previously Presented) An air sensor device configured to collect airborne particles and to evaluate collected airborne particles in order to determine if the collected airborne particles indicate the presence of a biological threat, comprising:

a regenerable solid collection surface for supporting a spot of immobilized airborne particles, the regenerable solid collection surface being specifically configured to remove particles from an air stream by impaction of the air stream against the regenerable solid collection surface;

means for regenerating the regenerable solid collection surface by removing particles from the regenerable solid collection surface, such that once regenerated, the regenerable collection solid surface can collect additional particles from the air, such that particles collected before regenerating the regenerable solid collection surface are substantially no longer present to contaminate particles collected after regeneration; and

means for analyzing the spot of immobilized airborne particles while the particles remain disposed on the regenerable solid collection surface to determine if the spot of immobilized airborne particles represents a biological threat.

2. (Canceled)

3. (Previously Presented) The device according to Claim 1, further comprising a spotting nozzle configured to direct the air stream towards the regenerable solid collection surface, such that a resulting impact of the air stream with the regenerable solid collection surface produces the spot of immobilized airborne particles on the regenerable solid collection surface.

4. (Previously Presented) The device according to Claim 1, wherein the regenerable solid collection surface is part of an impaction plate.

5. (Previously Presented) The device according to Claim 1, wherein the means for analyzing the spot of immobilized airborne particles is selected from the group consisting of a fluorescence detector, a Raman spectrometer, a Fourier transform infrared spectrometer, and a MALDI mass spectrometer.

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6. (Previously Presented) The device according to Claim 1, wherein the means for analyzing the spot of immobilized airborne particles is a fluorescence detector, further comprising an excitation light source configured to emit excitatory radiation that is directed towards the particles collected upon the regenerable solid collection surface, the excitatory radiation having a wavelength that excites any biomolecules comprising the particles to produce a fluorescence radiation to which the fluorescence detector responds.

7. (Previously Presented) The device according to Claim 1, wherein the means for analyzing the spot of immobilized airborne particles detects a biological signature selected from the group consisting of an autofluorescence, a Raman spectrum, an infrared absorption spectrum, and a mass spectrum.

8-20. (Canceled)

21. (Previously Presented) A method of detecting airborne biological particles, the method comprising:

depositing airborne particles on a regenerable solid collection surface provided for supporting a spot of immobilized airborne particles, such that the particles deposited on the regenerable solid collection surface form a spot;

measuring a biological signature present in the particles comprising the spot, using a detector configured for sensing the biological signature of the particles, while the particles remain deposited on the regenerable solid collection surface;

determining a concentration of the immobilized-airborne biological particles from the measurement of the biological signature in order to determine if the biological particles should be considered to represent a potential biological threat; and

regenerating the regenerable solid collection surface by removing particles from the regenerable solid collection surface, such that once thus regenerated, the regenerable solid collection surface can collect additional particles from the air, and such that particles collected before regeneration of the regenerable surface are substantially no longer present to contaminate particles collected after the regeneration.

22. (Previously Presented) The method according to Claim 21, wherein the step of depositing results from an inertial impaction of the particles on the regenerable solid collection surface.

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23. (Previously Presented) The method according to Claim 21, wherein the biological signature is an autofluorescence.

24. (Previously Presented) The method according to Claim 21, wherein the biological signature is selected from the group consisting of a Raman spectrum, an infrared absorption spectrum, and a mass spectrum.

25-28. (Canceled)

29. (Previously Presented) The device according to Claim 6, further comprising a dichroic mirror that substantially reflects the excitatory radiation and is substantially transparent to the fluorescence radiation emitted by the excited biomolecules, the dichroic mirror being positioned to reflect the excitatory radiation towards the particles deposited upon the regenerable solid collection surface.

30. (Previously Presented) The device according to Claim 29, further comprising at least one element selected from the group consisting essentially of:

(a) an excitation filter disposed between the excitation light source and the dichroic mirror; and

(b) an emission filter disposed between the dichroic mirror and the fluorescence detector.

31. (Previously Presented) The device according to Claim 1, wherein the means for regenerating the regenerable solid collection surface comprises at least one element selected from the group consisting essentially of:

(a) a brush that regenerates the regenerable solid collection surface by brushing away particles that were collected on the regenerable solid collection surface;

(b) a pad that regenerates the regenerable solid collection surface by pressing against the regenerable solid collection surface while the pad and the regenerable solid collection surface move relative to each other, so as to remove particles that were collected on the regenerable solid collection surface; and

(c) a wheel coupled to a motor that regenerates the regenerable solid collection surface by pressing against the regenerable solid collection surface while the motor rotates the wheel, so as to remove particles that were collected on the regenerable solid collection surface.

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32. (Previously Presented) The device of Claim 1, wherein the means for regenerating the regenerable solid collection surface comprises at least one element selected from the group consisting essentially of:

(a) a nozzle configured to direct a stream of high velocity air towards the regenerable solid collection surface to dislodge the particles deposited thereon;

(b) a blade configured to scrape the regenerable solid collection surface to dislodge the particles deposited thereon;

(c) means for electrostatically charging the regenerable solid collection surface, so that a static charge disperses the particles that were deposited thereon;

(d) means for directing energy to the particles collected upon the regenerable solid collection surface to dislodge the particles deposited thereon; and

(e) means for directing energy to the regenerable solid collection surface to dislodge the particles deposited thereon.

33. (Previously Presented) The device of Claim 1, further comprising a liquid coating applicator configured to moisten the regenerable solid collection surface prior to collecting the particles, thereby enhancing a collection efficiency of the regenerable solid collection surface.

34. (Previously Presented) The device of Claim 1, further comprising a mechanical homing sensor that positions the regenerable solid collection surface relative to at least one additional component selected from the group consisting essentially of:

(a) a spotting nozzle configured to deposit a spot of particles on the regenerable solid collection surface;

(b) the means for analyzing the spot of immobilized airborne particles;

(c) the means for regenerating the regenerable solid collection surface; and

(d) a liquid coating applicator used to apply a liquid to the regenerable solid collection surface.

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35. (Previously Presented) The device of Claim 1, further comprising a processor configured to implement at least one function selected from the group consisting essentially of:

(a) producing an alarm signal if the means for analyzing the spot of immobilized airborne particles indicates that the particles collected on the regenerable solid collection surface are potentially harmful to biological organisms;

(b) activating at least one additional component if the means for analyzing the spot of immobilized airborne particles indicates that the particles collected on the regenerable solid collection surface are potentially harmful to biological organisms; and

(c) determine a concentration of biological particles collected on the regenerable solid collection surface, and to activate an alarm signal if the processor determines that the concentration of biological particles on the regenerable solid collection surface exceeds a predetermined value.

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36. (Previously Presented) The apparatus of Claim 1, further comprising a processor coupled to the means for analyzing the spot of immobilized airborne particles, the processor being logically configured to implement at least one function selected from the group consisting essentially of:

(a) determine a concentration of particles collected on the regenerable solid collection surface, and to activate an air sampler to obtain a sample of particles from the same general volume of air that provided the particles originally deposited on the regenerable solid collection surface;

(b) activating an air sampler to obtain a sample of particles from the same general volume of air that provided the particles originally deposited on the regenerable solid collection surface, if the means for analyzing the spot of immobilized airborne particles indicates that the particles collected on the regenerable solid collection surface are potentially harmful to biological organisms;

(c) determine a concentration of particles collected on the regenerable solid collection surface, and to activate an analysis device to collect and analyze a sample of particles from the same general volume of air that provided the particles originally deposited on the regenerable solid collection surface; and

(d) activating an air analysis device to obtain and analyze a sample of particles from the same general volume of air that provided the particles originally deposited on the regenerable solid collection surface, if the means for analyzing the spot of immobilized airborne particles indicates that the particles collected on the regenerable solid collection surface are potentially harmful to biological organisms.

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37. (Previously Presented) The method of Claim 21, further comprising the steps of:

(a) comparing the concentration of immobilized airborne biological particles against predetermined criteria indicative of a potential alarm condition; and

(b) if the concentration of immobilized airborne biological particles equals or exceeds the predetermined criteria, responding by implementing at least one step selected from the group of steps consisting essentially of:

(i) activating an alarm signal directed to alert a designated party;

(ii) manipulating an air management component;

(iii) producing a warning signal;

(iv) activating an air sampler to collect a sample of particles from the same general area that provided the airborne particles deposited on the regenerable solid collection surface; and

(v) moving a damper in an air duct.

38. (Previously Presented) The method of Claim 21, wherein the step of regenerating the collection surface comprises at least one step selected from the group of steps consisting essentially of:

(a) brushing the regenerable solid collection surface, to dislodge the particles deposited on the regenerable solid collection surface;

(b) pressing a pad against the regenerable solid collection surface while there is relative motion between the pad and the regenerable solid collection surface, to remove the particles deposited on the regenerable solid collection surface;

(c) pressing a wheel against the regenerable solid collection surface while there is relative motion between the wheel and the regenerable solid collection surface, to remove the particles deposited on the regenerable solid collection surface;

(d) directing a stream of high velocity air towards the regenerable solid collection surface to dislodge the particles deposited on the regenerable solid collection surface;

(e) electrostatically charging the regenerable solid collection surface to electrostatically disperse the particles deposited on the regenerable solid collection surface; and

(f) directing energy to the particles collected upon the regenerable solid collection surface to dislodge the particles deposited on the regenerable solid collection surface.

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39-42. (Canceled)

43. (Previously Presented) The device according to Claim 1, further comprising a particle counter configured to determine an amount of airborne particles.

44. (Previously Presented) The device according to Claim 43, where the particle counter is capable of reporting a present value of particle counts in at least one predetermined size range.

45. (Previously Presented) The device according to Claim 35, wherein the additional component comprises at least one component selected from the group consisting essentially of an adjacently positioned aerosol sampler and an adjacently positioned aerosol analyzer.

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46. (Previously Presented) An air sensor device configured to collect airborne particles and to evaluate collected airborne particles in order to determine if the collected airborne particles indicate the presence of a biological threat, comprising:

(a) a regenerable solid collection surface means for supporting a spot of immobilized airborne particles, and for removing particles from an air stream by impaction of the air stream against the regenerable solid collection surface;

(b) a surface regenerator for automatically regenerating the regenerable solid collection surface by removing particles from the regenerable solid collection surface, such that once regenerated, the regenerable collection solid surface can collect additional particles from the air, such that particles collected before regenerating the regenerable solid collection surface are substantially no longer present to contaminate particles collected after the regeneration, the surface regenerator comprising at least one structure selected from a group consisting of:

(i) a brush that regenerates the regenerable solid collection surface by brushing away particles that were collected on the regenerable solid collection surface;

(ii) a pad that regenerates the regenerable solid collection surface by pressing against the regenerable solid collection surface while the pad and the regenerable solid collection surface move relative to each other, so as to remove particles that were collected on the regenerable solid collection surface; and

(iii) a wheel coupled to a motor that regenerates the regenerable solid collection surface by pressing against the regenerable solid collection surface while the motor rotates the wheel, so as to remove particles that were collected on the regenerable solid collection surface; and

(c) sensing means for determining if the spot of immobilized airborne particles represents a biological threat.

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47. (Previously Presented) A method of detecting airborne biological particles, the method comprising the steps of:

(a) depositing airborne particles on a regenerable solid collection surface provided for supporting a spot of immobilized airborne particles, such that the particles deposited on the regenerable solid collection surface form a spot;

(b) subsequently, measuring a biological signature present in the particles comprising the spot, using a detector configured for sensing the biological signature of the particles, while the particles remain deposited on the regenerable solid collection surface;

(c) determining a concentration of the immobilized airborne biological particles from the measurement of the biological signature in order to determine if the biological particles should be considered to represent a potential biological threat; and

(d) regenerating the regenerable solid collection surface by removing particles from the regenerable solid collection surface after step (c), so that once thus regenerated, the regenerable solid collection surface can collect additional particles from the air, such that particles collected before regeneration of the regenerable surface are substantially no longer present to contaminate particles collected after the regeneration.

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48. (New) An air sensor device configured to collect airborne particles and to evaluate collected airborne particles in order to determine if the collected airborne particles indicate the presence of a biological threat, comprising:

a regenerable solid collection surface for supporting a spot of immobilized airborne particles, the regenerable solid collection surface being specifically configured to remove particles from an air stream by impaction of the air stream against the regenerable solid collection surface;

means for regenerating the regenerable solid collection surface by removing particles from the regenerable solid collection surface without removing the regenerable solid collection surface from the air sensor device, such that once regenerated, the regenerable collection solid surface can collect additional particles from the air, such that particles collected before regenerating the regenerable solid collection surface are substantially no longer present to contaminate particles collected after regeneration; and

means for analyzing the spot of immobilized airborne particles while the particles remain disposed on the regenerable solid collection surface without removing the regenerable solid collection surface from the air sensor device, to determine if the spot of immobilized airborne particles represents a biological threat.

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